

IN THE CLAIMS

Claims 18, 20, 21, 26, 28, and 33-37 have been amended. All pending claims are reproduced below.

1 1-17. (Canceled)

1 18. (Currently Amended) A method for compiling a functional description expressed
2 in an interpretive, algorithmic language into target code for selected hardware, the method
3 comprising the steps of:

4 parsing the functional description expressed in the interpretive, algorithmic
5 language with at least one ~~undeclared~~ variable of unknown type or dimension into an
6 abstract syntax tree;

7 inferring a type and dimension for the variable of unknown type or dimension by
8 analyzing the usage of the ~~undeclared~~-variable of unknown type or dimension in the
9 abstract syntax tree;

10 assigning the inferred type ~~and~~ or dimension to the ~~undeclared~~ variable of
11 unknown type or dimension;

12 transforming compound statements in the abstract syntax tree into a series of
13 single statements; and

14 translating the abstract syntax tree into a register transfer level format.

1 19. (Previously Presented) The method for compiling a functional description
2 of claim 18, further comprising the steps of:

3 receiving a user directive file including at least one user defined directive selected
4 from the group consisting of constraint directives, assertions, and compiler hints; and
5 annotating the functional description according to the user directive file.

1 20. (Currently amended) The method for compiling a functional description of claim
2 18, further comprising the steps of:

3 analyzing a value range of the at least one ~~undeclared~~ variable of unknown type or
4 dimension; and

5 assigning a required precision for the at least one ~~undeclared~~ variable of unknown
6 type or dimension.

1 21. (Currently Amended) The method for compiling a functional description of claim
2 20, further comprising the step of:

3 parsing a real ~~undeclared~~ variable of unknown type or dimension into an integer
4 part and a fractional part, wherein said real ~~undeclared~~ variable of unknown type or dimension is
5 one of said at least one ~~undeclared~~ variable of unknown type or dimension.

1 22. (Previously Presented) The method for compiling a functional description
2 of claim 18, further comprising the steps of :

3 analyzing array access patterns across loop iterations; and

4 replacing a statement in a loop including a memory access with multiple
5 statements including the memory access to reduce the number of individual memory
6 accesses.

1 23. (Previously Presented) The method for compiling a functional description
2 of claim 18, further comprising the steps of:

3 analyzing compound loop structures to identify pipeline opportunities; and
4 applying the pipeline algorithm to pipeline opportunities to generate nodes
5 corresponding to the loop body, predicate nodes corresponding to loop conditional
6 statements, and a schedule for scheduling pipeline operations.

1 24. (Previously Presented) The method for compiling a functional description of
2 claim 18, wherein the step of transforming compound statements in the abstract syntax tree into a
3 series of single statements comprises the step of:

4 expanding a matrix operation into at least one loop.

1 25. (Previously Presented) The method for compiling a functional description of
2 claim 18, wherein the step of transforming compound statements in the abstract syntax tree into a
3 series of single statements comprises the step of:

4 deconstructing a compound statement into at least one simple statement.

1 26. (Currently Amended) A system for compiling a functional description expressed
2 in an interpretive, algorithmic language into target code for selected hardware comprising:

3 a parser for parsing the functional description expressed in the interpretive,
4 algorithmic language with at least one undeclared variable of unknown type or dimension
5 into an abstract syntax tree;

6 a type-shape analyzer, coupled to the parser, for inferring a type and a dimension
7 to the ~~undeclared~~ variable of unknown type or dimension by analyzing use of the
8 ~~undeclared~~ variable of unknown type or dimension in the abstract syntax tree;

9 a statement deconstructor, coupled to the type-shape analyzer, for transforming a
10 compound statement in the abstract syntax tree into at least one simple statement; and

11 a translator, coupled to the statement deconstructor, for translating the abstract
12 syntax tree into a register transfer level format.

1 27. (Previously Presented) The system for compiling a functional description
2 of claim 26, further comprising:

3 a user directive file, coupled to the parser, for annotating the functional
4 description with at least one user defined directive selected from the group consisting of
5 constraint directives, assertions, and compiler hints.

1 28. (Currently Amended) The system for compiling a functional description of claim
2 26, further comprising:

3 a precision analyzer, coupled to the type-shape analyzer, for determining the
4 precision of the at least one ~~undeclared~~ variable of unknown type or dimension.

1 29. (Previously Presented) The system for compiling a functional description
2 of claim 28, further comprising:

3 a real number parser, coupled to the precision analyzer, for parsing a real number
4 into an integer part and a fractional part.

1 30. (Previously Presented) The system for compiling a functional description
2 of claim 26, further comprising:

3 a memory access optimizer, coupled to the statement deconstructor, for analyzing
4 array access patterns across loop iterations and replacing a statement in a loop including a
5 memory access with multiple statements including the memory access to reduce the
6 number of individual memory accesses.

1 31. (Previously Presented) The system for compiling a functional description
2 of claim 26, further comprising:

3 a pipeline optimizer, coupled to the statement deconstructor, for analyzing
4 compound loop structures to identify pipeline opportunities and applying the pipeline
5 algorithm to pipeline opportunities to generate nodes corresponding to the loop body,
6 predicate nodes corresponding to loop conditional statements, and a schedule for
7 scheduling pipeline operations.

1 32. (Previously Presented) The system for compiling a functional description
2 of claim 26, wherein the statement deconstructor for transforming a compound statement in the
3 abstract syntax tree into at least one simple statement comprises:

4 a scalarizer, coupled to the type-shape analyzer, for expanding a matrix operation
5 into at least one loop.

1 33. (Currently Amended) One or more computer readable storage devices having
2 computer readable code embodied on said computer readable storage device, said computer
3 readable code for programming one or more computers to perform a method for compiling a

functional description expressed in an interpretive, algorithmic language into target code for selected hardware, the method comprising the steps of:

parsing the functional description expressed in the interpretive, algorithmic language with at least one undeclared variable of unknown type or dimension into an abstract syntax tree;

inferring a type and dimension for the undeclared variable of unknown type or dimension by analyzing the usage of the undeclared variable of unknown type or dimension in the abstract syntax tree;

assigning the inferred type and a dimension to the undeclared variable of unknown type or dimension;

transforming compound statements in the abstract syntax tree into a series of single statements; and

translating the abstract syntax tree into a register transfer level format.

34. (Currently Amended) ~~One or more computer readable storage devices having computer readable code embodied on said computer readable storage device, said computer readable code for programming one or more computers to perform a method for compiling a functional description of claim 33~~ The method of claim 33, further comprising the steps of:

receiving a user directive file including at least one user defined directive selected from the group consisting of constraint directives, assertions, and compiler hints; and

annotating the functional description according to the user directive file.

1 35. (Currently Amended) ~~One or more computer readable storage devices having~~
2 ~~computer readable code embodied on said computer readable storage device, said computer~~
3 ~~readable code for programming one or more computers to perform a method for compiling a~~
4 ~~functional description of claim 33~~ The method of claim 33, further comprising the steps of:

5 analyzing a value range of the at least one ~~undeclared~~ variable of unknown type or
6 dimension; and

7 assigning a required precision for the at least one ~~undeclared~~ variable of unknown
8 type or dimension.

1 36. (Currently Amended) ~~One or more computer readable storage devices having~~
2 ~~computer readable code embodied on said computer readable storage device, said computer~~
3 ~~readable code for programming one or more computers to perform a method for compiling a~~
4 ~~functional description of claim 33~~ The method of claim 33, further comprising the steps of:

5 analyzing array access patterns across loop iterations; and

6 replacing a statement in a loop with a memory access with multiple statements
7 with the memory access to reduce the number of individual memory accesses.

1 37. (Currently Amended) ~~One or more computer readable storage devices having~~
2 ~~computer readable code embodied on said computer readable storage device, said computer~~
3 ~~readable code for programming one or more computers to perform a method for compiling a~~
4 ~~functional description of claim 33~~ The method of claim 33, further comprising the steps of:

5 analyzing compound loop structures to identify pipeline opportunities; and

6 applying the pipeline algorithm to pipeline opportunities to generate nodes
7 corresponding to the loop body, predicate nodes corresponding to loop conditional
8 statements, and a schedule for scheduling pipeline operations.